Claims

Claimed is:

1. An electrical machine (2) with an external stator and an inward disposed rotor which is rotatably supported on bearings, and which machine possesses also a rotor laminate pack (18) and a rotor shaft (4) affixed rotationally with said rotor laminate pack (18), therein characterized, in that the rotor is constructed to be hollow and a cooling medium can be transported through a space between the rotor laminate pack (18) and the rotor shaft (4).

2. An electrical machine (2), in accord with Claim 1 therein characterized, in that between the rotor laminate pack (18) and the rotor shaft (4), a hollow interposed shaft (26) is inserted, upon which the rotor laminate pack (18) is placed.

3. An electrical machine (2), in accord with Claim 1 or 2, therein characterized, in that the rotor shaft (4) is constructed as a webbed shaft, which exhibits on its circumference a plurality of webs (28, 46).

4. An electrical machine (2), in accord with one of the Claims 1 to 3, therein characterized, in that the rotor shaft (4) possesses a ventilating device (32) on at least one of its axial ends for increasing the transported volume or the transport pressure of the cooling medium.

5. An electrical machine (2), in accord with Claim therein characterized, in that the ventilating device (32) at the ends of the rotor shaft (4) is constructed as a ventilating fan.

6. An electrical machine (2), in accord with one of the Claims 1 to 5, therein characterized, in that between the rotor shaft (4) and the interposed shaft (26) i.e. the rotor laminate pack (18), (18) at least one ventilating device (54) is provided for the transport of the cooling medium.

7. An electrical machine (2), in accord with one of the Claims 1 to 6 therein characterized, in that the rotor shaft (4) possesses webs (28, 46) which are in the shape of diffuser blades.

8. An electrical machine (2), in accord with one of the Claims 1 to 6 therein characterized, in that the rotor shaft (4) is constructed in the shape of a screw conveyor.

9. An electrical machine (2), in accord with one of the Claims 1 to 8 therein characterized, in that the rotor shaft (4) and the hollow interposed shaft (26), i.e. the rotor laminate pack (18), contact one another only along touching zones which are nearly linelike for the formation of smaller heat transfer surfaces.

10. An electrical machine (2), in accord with one of the Claims 1 to 9 therein characterized, in that for the construction of a rotor shaft (4), which can allow a large quantity of cooling medium to flow between it and the interposed shaft (26), i.e. the rotor laminate pack (18), and yet be constructed at the same time with sufficient structural strength, the cross-section of said rotor shaft (4) is designed in the shape of a star with four webs (28).

11. An electrical machine (2), in accord with one of the Claims 1 to 9, therein characterized, in that for the construction of a rotor shaft (4), which allows a large quantity of cooling medium to pass between itself and the interposed shaft (26), i.e. the rotor laminate pack (18), and for the provision of a large heat transfer surface at the same acceptance of stress energy, the rotor shaft (4) is designed in the shape of three sickle shaped webs (46).

12. An electrical machine (2), in accord with one of the Claims 1 to 11, therein characterized, in that the webs (28, 46) are interrupted and do not lie with their entire length against the interposed shaft (26), i.e. the rotor laminate pack (18).

13. An electrical machine (2), in accord with one of the Claims 1 to 12 therein characterized, in that the rotor shaft (4) is manufactured as a separate forged part or a precision cast part and is pressed into the hollow interposed shaft (26), i.e. the rotor laminate pack (18), to achieve a press fit.

14. An electrical machine (2), in accord with one of the Claims 1 to 13 therein characterized, in that the rotor shaft (4) is made from a material of low heat conductivity.

15. An electrical machine (2), in accord with Claim 14, therein characterized, in that the material of low heat conductivity is a high alloy steel.

16. An electrical machine (2), in accord with Claim 14, therein characterized, in that the material of low heat conductivity is titanium.

17. An electrical machine (2), in accord with one of the Claims 1 to 16, therein characterized, in that elements (34) for the support of a non-turbulent conductance of the cooling medium are provided.

18. An electrical machine (2), in accord with one of the Claims 1 to 17, therein characterized, in that a heat exchanger (36) is integrated into the electrical machine (2).

19. An electrical machine (2), in accord with Claim 18, therein characterized, in that the heat exchanger (36) possesses cooling tubes (44, 48) which encompass the stator.

20. An electrical machine (2), in accord with Claim 19, therein characterized, in that the cooling tubes (44, 48) stand in heat transferring connection with the cooling ribs (38).

21. An electrical machine (2), in accord with Claim 20, therein characterized, in that the cooling ribs (38) are placed in a separate construction component, which is in the form of a cooling basin (66) and can be installed on the electrical machine (2).

22. An electrical machine (2), in accord with Claim 20 or 21, therein characterized, in that cooling tubes (70) are provided in the cooling ribs (38).

23. An electrical machine (2), in accord with Claim 22, therein characterized, in that the cooling tubes 70 in the cooling ribs (38) are mounted at an angle to the cooling tubes (44, 48) which encompass the stator.

24. An electrical machine (2), in accord with one of the Claims 1 to 23, therein characterized, in that the cooling medium is air.

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